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STATE CORPORATION COMMISSION
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Case No. PUR-2019-00154

Sponsor: VIRGINIA POWER

Exhibit No. 3

Witness: BAINE

Bailiff: RENEE MILES

WITNESS DIRECT TESTIMONY SUMMARY

Witness: Edward H. Baine

Title: Senior Vice President – Distribution

Summary:

Company Witness Edward H. Baine provides the background and an overview of the Company's proposed plan to transform its electric distribution grid (the "GT Plan" or "Plan"), including the needs driving the Plan and the Company's engagement with customers and stakeholders which drove changes to the Plan. Mr. Baine also addresses the Final Order issued in the 2018 GT Plan proceeding, and explains how the Company addressed issues raised in that order. Finally, Mr. Baine introduces the Company's other witnesses in this proceeding.

As to need, Mr. Baine explains that the Company is proposing the GT Plan to address the current and future needs of the Company's distribution grid in a systematic manner, recognizing and accommodating significant changes in the electric utility industry and changing customer expectations.

Next, Mr. Baine provides an overview of the Commission's findings in the 2018 GT Plan proceeding, and describes the Company's efforts to address the concerns raised by the Commission, its Staff, and other parties to that proceeding.

Mr. Baine next describes the Company's efforts to seek customer feedback and engage stakeholders. Through collaborative conversations with stakeholders, Mr. Baine describes the four common goals for grid transformation that emerged: (i) Optionality; (ii) Sustainability; (iii) Resiliency; and (iv) Affordability.

Mr. Baine next describes the components of the GT Plan, many of which are foundational to a transformed grid: (i) AMI; (ii) CIP; (iii) grid improvements, both grid technologies and grid hardening projects; (iv) telecommunications infrastructure; (v) cyber security; and (vi) the Smart Charging Infrastructure Pilot Program. As Mr. Baine explains, the Company also proposes a customer education plan that touches upon these components.

As Mr. Baine testifies, the GT Plan meets the statutory objectives of the GTSA by facilitating improvements that will make the grid more reliable and resistant while also meeting the increased need for visibility on the grid, which will allow the Company to effectively monitor and operate the evolving and increasingly complex grid infrastructure while incorporating DER, battery storage, EVs, microgrids, and other emerging technologies.

Mr. Baine additionally provides an overview of the costs and benefits of the GT Plan, and provides a list of proposed metrics intended to track the success of the Plan.

Finally, Mr. Baine testifies as to why now is the optimal time for a grid transformation plan.

**DIRECT TESTIMONY
OF
EDWARD H. BAINE
ON BEHALF OF
VIRGINIA ELECTRIC AND POWER COMPANY
BEFORE THE
STATE CORPORATION COMMISSION OF VIRGINIA
CASE NO. PUR-2019-00154**

1 **Q. Please state your name, business address and position of employment.**

2 A. My name is Edward H. Baine and my business address is 600 East Canal Street,
3 Richmond, Virginia 23219. I am Senior Vice President – Distribution for the Power
4 Delivery Group of Dominion Energy, Inc. (“Dominion Energy”). A statement of my
5 background and qualifications is attached as Appendix A.

6 **Q. What are your management responsibilities with respect to Virginia Electric and**
7 **Power Company (“Dominion Energy Virginia” or the “Company”)?**

8 A. I am responsible for all facets of Dominion Energy Virginia’s regulated electric
9 distribution business that provides electricity to over 2.5 million customer accounts in
10 Virginia, powering the business economy and serving over 5 million residents.

11 **Q. What is the purpose of your testimony in this proceeding?**

12 A. The purpose of my testimony is to provide background and an overview of the
13 Company’s proposed plan to transform its electric distribution grid (the “Grid
14 Transformation Plan,” the “GT Plan,” or the “Plan”), including the needs driving the Plan
15 and the Company’s engagement with customers and stakeholders to refine the Plan. I
16 will also address the Final Order dated January 17, 2019, issued by the State Corporation
17 Commission of Virginia (the “Commission”) in Case No. PUR-2018-00100 on the
18 Company’s initial filing related to the GT Plan (the “2018 Final Order”), and will explain

1 how the Company has addressed the issues raised by the Commission in that order.

2 Finally, I will introduce the Company's other witnesses in this proceeding.

3 **Q. During the course of your testimony, will you introduce an exhibit?**

4 A. Yes. Company Exhibit No. __, EHB, consisting of Schedules 1 and 2, was prepared
5 under my supervision and direction and is accurate and complete to the best of my
6 knowledge and belief. Schedule 1 provides an overview of the costs of the GT Plan, and
7 Schedule 2 provides the metrics the Company proposes to track the success of the Plan,
8 along with the Company witnesses who support each metric. The table below provides a
9 description of these schedules:

Schedule	Description
1	Overview of GT Plan Costs
2	Proposed Metrics and Witness Support

10 I also sponsor certain sections of the Grid Transformation Plan, the executive summary of
11 Dominion Energy Virginia's plans for grid transformation (the "Plan Document"), as
12 indicated in Appendix A to the Plan Document.

13 **Q. You mentioned the Plan Document, can you explain the purpose of this document?**

14 A. The Company prepared the Plan Document as an executive summary of the Grid
15 Transformation Plan. The Plan Document guides the reader through the need for grid
16 modernization, the state of the existing distribution system, the development of the GT
17 Plan, an overview of the Plan itself, and the associated customer benefits. The Plan
18 Document also provides an acronym list and glossary that can serve as a quick reference
19 guide for the words and concepts discussed in testimony. It is intended to be a reference
20 document that provides the drivers and solutions that make up the Grid Transformation

1 Plan, along with the future technologies, plans and programs the Company commits to
2 pursue upon Commission approval of the Plan.

3 **Q. Mr. Baine, how is your testimony organized?**

4 A. My testimony is organized into the following sections:

5 I. Need for the Grid Transformation Plan

6 II. Background and Overview of the Grid Transformation Plan

7 III. The Grid Transformation Plan

8 IV. Conclusion

9 **I. NEED FOR THE GRID TRANSFORMATION PLAN**

10 **Q. Why is the Company proposing the Grid Transformation Plan?**

11 A. The Company is proposing the Grid Transformation Plan to address the current and
12 future needs of the Company's distribution grid in a systematic manner. There is a
13 paradigm shift driven by the needs of our customers, technology, and security that are
14 creating significant changes in our industry.

15 **Q. Please elaborate on the significant changes in the energy industry.**

16 A. Modern society increasingly relies on electronic and connected devices for nearly all
17 functions of daily life, making the electric power grid the critical foundation for
18 practically every aspect of functioning in today's world. Customers are more reliant on
19 electricity than ever before in many ways from education, commerce and health care
20 systems to the banking, communications, and transportation industries. As society has
21 grown more dependent on electricity, so too have the threats to this critical infrastructure,
22 necessitating investments in physical and cyber security that can meet the evolving nature

1 of the threat landscape. In addition, outages caused by severe weather and other events
2 only become more disruptive. While service interruptions have always been an
3 inconvenience, the safe, reliable, and consistent delivery of power has never been more
4 important than it is today and customer expectations for a high level of reliability has
5 intensified.

6 The demand for electricity generated from renewable energy resources has also
7 increased. In contrast to conventional power sources, renewable energy sources can
8 connect directly to the distribution grid. The distribution grid was originally designed for
9 the one-way flow of electricity—not for the direct connection of generation sources that
10 cause two-way power flow. In the meantime, technology has developed that can provide
11 electric utilities with increased visibility on the current state of their systems, which helps
12 utilities manage two-way power flow and maximize the benefit of distributed energy
13 resources. For example, intelligent grid devices can transmit information to the utility
14 that will allow for visibility and analysis of the real-time status at substations and circuits
15 that support directly connected generation and customer load.

16 Another significant change is the increased customer demand for information. Many
17 customers want their detailed energy usage information so that they can make informed
18 decisions about their consumption, and they want the flexibility to access that
19 information over different channels of communications. Customers also want more
20 options, such as different rates and choices on when and how to pay their bills. When
21 outages do occur, customers want frequent, up to date information on restoration.

1 Q. What are the structural limitations of the existing distribution system in light of
2 these significant changes?

3 A. As noted above, the Company's existing distribution grid was originally designed for
4 one-way delivery of electricity to meet customers' demand—from the substation through
5 the distribution grid to the end-use customer. The existing grid was not designed to
6 effectively integrate the ever-increasing amount of distributed energy resources
7 ("DERs"), such as solar and wind generation, which feed directly into the distribution
8 system. Consequently, the existing grid is fundamentally challenged in adapting to the
9 two-way power flow created by DER. The Company has limited visibility into the
10 distribution grid, and cannot monitor in real-time, or remotely respond to, the effects of
11 these two-way power flows or other voltage stability issues. The existing infrastructure
12 will not support the Company's use of DERs during an outage event.

13 With Commission approval of Phase IB, the Company will know where the outage
14 occurs, can isolate the outage, and can bring the DERs back online more quickly. With
15 the introduction of DERs on the distribution grid, we cannot think about the grid's
16 performance only in terms of reliability, but must also now take into consideration the
17 impact of the grid's availability (or unavailability) with as much focus as we do with the
18 transmission grid today. Indeed, while the GT Plan is needed to help support the
19 proliferation of DERs on the grid and address any related issues, it also maximizes the
20 benefits for DERs, through reliability, startup power, voltage quality, efficiency and
21 energy transaction. In addition, because DERs rely on the distribution system to deliver
22 the electricity they produce, a resilient distribution system is vital to maximizing the
23 value of DERs.

1 The majority of the Company's customers are served with automated meter reading
2 ("AMR") meters, which provide after-the-fact total usage once per month. As such,
3 AMR meters do not provide dynamic interval energy usage information to assist
4 customers in making informed and immediate decisions on consumption that can affect
5 the result on their next bill, and that can allow the utility to provide more advanced
6 customer rates. Nor are AMR meters capable of providing the Company with basic
7 information such as outage notifications, leaving the reporting obligation on the
8 customer. Further, the over 20 year-old customer information system on which the
9 Company relies for managing customer accounts is built on antiquated technology that
10 cannot accommodate the incremental volume and complexity of customer interactions,
11 such as billing more complex rate structures, providing rate comparisons, leveraging
12 graphics in bill presentment, or registering multiple contacts with the account for
13 notifications (e.g., business owner, facility manager, and billing administrator).

14 **Q. The Grid Transformation and Security Act of 2018 (the "GTSA") requires that the**
15 **Company evaluate "[l]ong-term electric distribution grid planning and proposed**
16 **electric distribution grid transformation projects" as part of its integrated resource**
17 **planning process. Do you have any comments?**

18 **A.** The Company has continuously engaged in long-term distribution grid planning since its
19 inception, as any prudent utility must. Company Witness Robert S. Wright, Jr., details
20 the comprehensive analysis that led to the proposed grid improvement solutions proposed
21 herein.

22 That said, the Company recognizes that its distribution planning must evolve to adapt to
23 the fundamental changes in the energy industry discussed above. To that end, the

1 Company has attached a white paper as Appendix B to the Plan Document that provides a
2 detailed overview of the Company's current distribution planning process and limitations,
3 the investments needed to evolve the process, and how the Company's integrated
4 distribution planning ("IDP") process will transform over time.

5 II. BACKGROUND AND OVERVIEW OF THE GRID TRANSFORMATION PLAN

6 Q. Please provide background related to the Company's Grid Transformation Plan.

7 A. In 2018, Dominion Energy Virginia developed a 10-year plan to transform its electric
8 distribution grid into a smarter, stronger, and greener grid. The Company developed this
9 plan consistent with the need for such transformation on its grid and the support for
10 transformation efforts by the General Assembly and other stakeholders.

11 In July 2018, in Case No. PUR-2018-00100, the Company petitioned for approval of the
12 first three years of the Grid Transformation Plan, which was referred to in that filing as
13 "Phase I." Phase I focused on seven components of the overall Grid Transformation
14 Plan: (i) advanced metering infrastructure ("AMI"); (ii) customer information platform
15 ("CIP"); (iii) reliability and resilience; (iv) telecommunications infrastructure; (v) cyber
16 and physical security; (vi) predictive analytics; and (vii) emerging technology.

17 In January 2019, the Commission issued the 2018 Final Order approving proposed
18 Phase I investments related to cyber and physical security, including supporting
19 telecommunications infrastructure, as reasonable and prudent. The Company will refer to
20 these portions of the GT Plan approved in the 2018 Final Order as "Phase IA" of the GT
21 Plan. Company Witnesses Jonathan S. Bransky and Bradley R. Carroll, Sr., will discuss
22 the approved Phase IA security and telecommunications investments, respectively,

1 including how the Company has differentiated approved and unapproved portions of such
2 investments. The Commission denied the remaining portions of the proposed Phase I,
3 without prejudice to the Company seeking approval of the GT Plan in future petitions and
4 provided additional requirements to incorporate in the next filing through the 2018 Final
5 Order.

6 **Q. Please summarize the findings contained in the 2018 Final Order.**

7 A. The Commission acknowledged on page 15 of the 2018 Final Order that “smart meters
8 and other grid enhancements hold the promise for a true transformation of the grid and
9 for the more efficient consumption of electricity.” While the Commission denied the
10 majority of the proposed Phase I investments, it recognized that such expenditures would
11 be reasonable and prudent if “accompanied by a sound and well-crafted plan to fulfill the
12 promise that smart meter technology and grid enhancements offer.” The 2018 Final
13 Order provided details on what a sound and well-crafted plan should contain, including
14 “detailed, accurate, and reasonable cost information” (page 9) and “a level of benefits
15 commensurate with the projected costs” (page 14). The 2018 Final Order also indicated
16 that a well-crafted plan should demonstrate the need for the proposed investments,
17 specifically as it relates to reliability and resiliency investments.

18 **Q. What steps did the Company take after it received the 2018 Final Order?**

19 A. Since its issuance, the Company has been working diligently to address the concerns
20 raised by the Commission, its Staff, and other parties to last year’s GT Plan proceeding.
21 Among other action items, the Company continued to focus on ensuring that its proposed
22 investments maintained alignment with the statutory objectives of grid transformation—
23 to facilitate integration of distributed energy resources and to enhance physical electric

1 distribution grid reliability and security—as well as the Company’s objective to also
2 enhance the customer experience. The Company issued multiple requests for proposals
3 (“RFPs”) across programs to strengthen the accuracy and reasonableness of the cost
4 estimates for proposed investments. To refine its cost estimates, the Company also began
5 to prepare the project scopes and designs for the targeted mainfeeder segments on which
6 it proposes grid improvement investments. The Company retained an independent,
7 experienced, third-party partner, West Monroe Partners, to generate a cost-benefit
8 analysis for the GT Plan based on its industry expertise. In addition, the Company
9 solicited customer feedback and convened a series of stakeholder meetings to receive
10 input and feedback on next steps for our Grid Transformation Plan. As a result, the
11 Company has responded to concerns raised on its GT Plan to date from the Commission,
12 its Staff, and stakeholders in a meaningful manner, and has incorporated those results into
13 this filing to the best of its ability.

14 **Q. You mentioned that the Company solicited customer feedback and convened a**
15 **series of stakeholder meetings. Please elaborate.**

16 **A.** Dominion Energy Virginia strives to meet its customers’ energy needs while providing a
17 seamless customer experience. To that end, the Company frequently seeks feedback
18 from its customers in various forms and forums. The Company has also sought specific
19 feedback to assist in the development of the Grid Transformation Plan. Section V.B of
20 the Plan Document describes this customer engagement.

21 The Company also convened a series of stakeholder meetings in mid-2019, facilitated by
22 an industry expert, Navigant Consulting, Inc. (“Navigant”) that guided the conversation
23 on the stakeholders’ vision and objectives for grid transformation. Through collaborative

1 conversations with stakeholders, four common goals for grid transformation emerged:
2 (i) enable all customers with accessible, affordable electric service and engage customers
3 with programs, education, and data access (“Optionality”); (ii) evolve to a clean and
4 decentralized grid that integrates distributed energy resources, such as solar and wind,
5 and electric vehicles (“Sustainability”); (iii) build a more resilient energy grid that will
6 reduce the effects of outages with automation and advanced asset management
7 (“Resiliency”); and (iv) deliver value for customers by optimizing demand and seeking to
8 reduce system and customer costs (“Affordability”). Section V.C of the Plan Document
9 describes how the components of the GT Plan align with these goals.

10 **Q. What is the Company requesting in this proceeding?**

11 A. The Company is requesting approval of the next phase of the Grid Transformation Plan,
12 which the Company will refer to as “Phase IB.” Phase IB covers the same period as
13 Phase I in the previous filing—the years 2019, 2020, and 2021. The 2019 costs include
14 activities needed to develop a filing that is consistent with the guidance received from the
15 2018 Final Order, as well as activities related to the limited installation of smart meters in
16 2019. The Company then seeks approval of two years of GT Plan investments, those for
17 2020 and 2021.

18 **Q. What are the components of Phase IB of the GT Plan?**

19 A. Phase IB focuses on six components of the Grid Transformation Plan, many of which are
20 foundational to a transformed grid: (i) AMI; (ii) CIP; (iii) grid improvements;
21 (iv) telecommunications infrastructure; (v) cyber security; and (vi) the Smart Charging
22 Infrastructure Pilot Program. The Company also proposes a customer education plan that
23 touches upon each of these components. Building on the foundational components of the

1 previous filing, the Company developed detailed cost estimates for the investments based
2 on responses to RFPs and renegotiating existing contracts; incorporated feedback from
3 stakeholders and customers; completed project designs and scopes in order to provide
4 more detail regarding the solutions proposed for grid improvements; and completed a
5 cost-benefit analysis that included future programs that will leverage the proposed GT
6 Plan components. The comprehensive GT Plan proposed herein is the result of this work
7 and represents the Company's commitment to execute the proposed components and
8 future programs with Commission approval.

9 III. THE GRID TRANSFORMATION PLAN

10 **Q. What are the statutory objectives for grid transformation?**

11 A. I am not a lawyer, however, my understanding of the statutory objectives for grid
12 transformation, as provided in the policy direction given by the General Assembly, are to
13 facilitate integration of distributed energy resources and to enhance physical electric
14 distribution grid reliability and security.

15 **Q. How does the proposed Grid Transformation Plan meet these objectives?**

16 A. The Grid Transformation Plan will facilitate integration of DER and will enhance
17 physical electric distribution grid reliability and security by enabling connectivity
18 between intelligent grid devices, control centers, automated control systems, distributed
19 energy resources, electric vehicle ("EV") infrastructure, and supporting technologies.
20 The Plan also includes activities to harden the grid. Together, these improvements will
21 result in a modernized and interconnected distribution grid that is available and allows for
22 proactive management of assets, prevents certain outages on hardened feeders, and
23 enables speedier recovery times when outage events and storms do occur. These

1 improvements will make the grid more reliable and resilient while also meeting the
2 increased need for visibility on the grid, which will allow the Company to effectively
3 monitor and operate the evolving and increasingly complex grid infrastructure while
4 incorporating DER, battery storage, EVs, microgrids, and the Smart Charging
5 Infrastructure Pilot Program.

6 This increased visibility provided by AMI, intelligent grid devices, and automated
7 systems, when paired with a more resilient grid, in turn will enable the Company to
8 effectively interconnect and operate the grid with DER, ensuring that the intermittent
9 output from these resources does not pose threats to voltage stability and system
10 operations and reliability, while also optimizing the output from these resources with the
11 grid being more available. The investments proposed in the GT Plan will also provide
12 the Company with more options to integrate a wide range of emerging technologies. For
13 example, electric vehicles continue to gain popularity. A transformed grid will allow the
14 Company to intelligently manage the increased demand for electricity needed to charge
15 electric vehicles and incorporate batteries and microgrids in a manner that benefits all
16 customers.

17 **Q. Beyond the statutory objectives for grid transformation, does the GT Plan meet the**
18 **goals for grid transformation identified through the stakeholder process?**

19 **A.** Yes, it does. For similar reasons as just described, and as further discussed in Section
20 VI.C of the Plan Document, the proposed Grid Transformation Plan investments meet the
21 goals of Optionality, Sustainability, Resiliency, and Affordability.

1 Q. Please provide an overview of the proposed Phase IB of the GT Plan.

2 A. Phase IB of the Plan will focus on installing the foundational infrastructure that is
3 required to create a transformed grid. Vtally, the Company plans to fully deploy AMI
4 across its service territory. At the same time, the Company proposes to begin the
5 transition to a new CIP. Together, AMI and the CIP will unlock a host of benefits to the
6 Company and its customers, from operational efficiency to time-varying rates to energy
7 efficiency and targeted demand-side management programs.

8 In conjunction with AMI and CIP, the Company also has plans to invest in grid
9 improvements, focusing on both grid technologies and grid hardening. For example, the
10 Company proposes to install a self-healing grid, which includes technologies and systems
11 that automate power restoration, reducing both the impact and length of power
12 interruptions. During this process, the Company will also focus on grid resiliency by, for
13 example, hardening mainfeeders and proactively upgrading equipment.

14 All of these investments require robust telecommunications and security infrastructure,
15 and such accompanying investments are included in Phase IB.

16 Finally, the Company proposes specific investments related to EVs. Specifically, the
17 Company proposes investments in EV infrastructure targeting different customer
18 segments, including transit bus charging, direct current ("DC") fast charging, workplace
19 charging, multi-family residential charging, and rideshare charging.

20 Throughout the Grid Transformation Plan, educating customers is of primary importance,
21 including education about the grid transformation process and its benefits, about the
22 associated projects and investments, and about when and how they can fully utilize the

new capabilities and benefits of the transformed distribution grid. Section VI.A.7 of the Plan Document describes the Company's plans for customer education across all the Plan components.

Q. What are the costs proposed for Phase IB of the GT Plan?

A. The forecasted total proposed investment estimate associated with Phase IB of the Grid Transformation Plan is shown in Table 1 below in capital investment and operations and maintenance ("O&M") investment.

Table 1. Phase IB Capital & O&M Investments

<i>Nominal \$, in Millions</i>	2019	2020	2021	
	Year 1	Year 2	Year 3	3-year Total
Phase IA	\$8.5	\$17.9	\$37.0	\$63.3
Capital	\$7.3	\$17.7	\$36.5	\$61.4
O&M	\$1.2	\$0.2	\$0.5	\$1.9
Phase IB	\$39.4	\$246.8	\$307.3	\$593.4
Capital	\$26.8	\$218.4	\$265.4	\$510.5
O&M	\$12.6	\$28.4	\$41.9	\$83.0

Additional details are provided in my Schedule 1. The Company's other witnesses will support and provide further detail on these costs, and will describe the robust process for how the cost estimates were created.

Q. What are the benefits of the Grid Transformation Plan?

A. The quantitative benefits of the GT Plan can be grouped into two general categories: customer benefits and additional benefits. Quantitative customer benefits include reliability improvements, energy and demand savings, avoided capital, avoided O&M, and reduction of bad debt and energy diversion. The cost-benefit analysis ("CBA")

1 shows the proposed investments are beneficial to customers and represent a positive
2 business case from a financial perspective providing over \$3 billion of customer benefits,
3 which represents net benefit to customers of approximately \$322.5 million all on a net
4 present value basis. Additional quantitative benefits include reduced greenhouse gas
5 (“GHG”) emissions, increased EV ownership savings, and positive economic
6 development impacts. Some of the benefits derive from programs and offerings that the
7 Company intends to implement, including a time-varying rate, a peak time rebate
8 program, a prepay program, and a program related to residential EV use. Including these
9 in the cost-benefit analysis reflects the Company’s commitment to these programs and
10 offerings.

11 Beyond these quantifiable benefits, the GT Plan will provide many qualitative benefits,
12 like avoiding a cyberattack; providing resilient service to critical services and
13 infrastructure like homeland security, large medical facilities, public safety agencies,
14 state and local governments, telecommunications, transportation, and water treatment and
15 pump facilities; and providing customers with accurate and timely information that can
16 impact their choices to use energy.

17 **Q. Based on the costs and benefits of the GT Plan, do you believe that the projects**
18 **associated with Phase IB, including the estimated costs, should be found reasonable**
19 **and prudent by the Commission?**

20 **A.** Yes, I do. As I mentioned earlier, the Company retained West Monroe Partners (“West
21 Monroe”) to complete a CBA for the GT Plan. Company Witness Thomas Hulsebosch
22 presents testimony explaining that analysis and presenting the results. As sponsored by
23 Mr. Hulsebosch, the proposed investments are beneficial to customers and represent a

1 positive business case from a financial perspective, even considering only benefits to
2 customers. Indeed, as further described by Mr. Hulsebosch, this benefit estimate may be
3 conservative. Mr. Hulsebosch also shows additional benefits like reduced GHG
4 emissions, savings to EV owners and economic benefits.

5 **Q. Does the Company intend to establish performance metrics to track the success of**
6 **the GT Plan?**

7 A. Yes. A list of proposed metrics is attached as my Schedule 2. As reflected therein, the
8 specific metrics are sponsored by other Company witnesses by component. The
9 Company will continue to work with Staff to refine the list to determine the ultimate
10 performance metrics to be approved by the Commission that the Company will use to
11 track the GT Plan's success.

12 **Q. How does the Company intend to report on these metrics?**

13 A. The Company proposes to submit an annual report on the progress of the Grid
14 Transformation Plan by April 30 of each year for the prior calendar year, starting in 2021.
15 The Company also plans to continue stakeholder engagement on the GT Plan in the
16 future. The Company intends to work with stakeholders to determine the best structure,
17 process, and cadence of stakeholder meetings going forward.

18 IV. CONCLUSION

19 **Q. Why is now an optimal time for a grid transformation plan?**

20 A. The time is right for numerous reasons. Our customers are expecting different
21 interactions, services, and offerings from our Company. We need to deliver for our
22 customers. In addition, costs for the relevant technologies have decreased as peer utilities

1 across the country have worked to transform their distribution grids. The Company has
2 talked to our peer utilities and has learned from their experiences. Additionally, the
3 Company has tested certain components of the GT Plan on a smaller scale. The
4 Company used this knowledge to develop the GT Plan, ensuring that its investments will
5 be reasonable and prudent for our customers.

6 Further, the General Assembly has recognized the importance of investments to
7 transform the electric distribution grid in the Commonwealth with the passage of the
8 GTSA, identifying such qualifying investments as being in the public interest. These
9 investments will be critical to prepare for the significant growth in intermittent renewable
10 generation resources, also signaled by the GTSA, with up to 5,500 MW of new
11 renewable generation in the public interest, 500 MW of which is specifically focused on
12 small-scale DER development. Recent policy direction will continue to fuel the
13 exponential growth the Company has experienced in new DER interconnection, even
14 since the 2018 GT Plan filing. In 2019 alone, the Company has already interconnected
15 more than 1,700 new Net Energy Metering ("NEM") customers, representing over 16
16 MW of new NEM capacity, nearly a 100% increase over the same period last year. As
17 the proliferation of DERs and two-way power flows continues in the Commonwealth, we
18 must plan accordingly.

19 Indeed, the Governor's recent issuance of Executive Order 43 ("EO 43")¹ recognizes the
20 beginning of grid transformation and through executive action provides guidelines for
21 expanding access to clean energy that are dependent upon a modern, transformed grid.

¹ Commonwealth of Virginia, *Executive Order Number Forty-Three (2019): Expanding Access to Clean Energy and Growing the Clean Energy Jobs of the Future*, September 16, 2019.

1 Specifically, EO 43 requires the Commonwealth to develop a plan to produce thirty
2 percent of Virginia's electricity from renewable energy sources by 2030 and by 2050 to
3 obtain one hundred percent of the Commonwealth's electricity needs from carbon-free
4 sources. The Company has declared its support for the bold targets established by EO 43
5 and recognizes that the GTSA paves the way for achieving them. The Phase IB
6 investments proposed in today's filing are necessary to lay the foundation essential to
7 reaching objectives and timeline established by EO 43.

8 Additionally, the General Assembly has continued to recognize the need for grid
9 transformation, passing additional legislation through Senate Bill 1769 in the 2019
10 Session concerning dynamic rate structures that assumed foundational investments in
11 AMI and the CIP. In the end, we believe that the public policy underlying the GTSA is
12 of critical importance to our customers and the Commonwealth overall. The Company's
13 GT Plan will take a strategic approach to deploy these interdependent and coordinated
14 offerings that will result in a smarter, stronger, and greener electric distribution grid. The
15 Plan will benefit our customers, and will address the current and future needs driven from
16 this paradigm shift.

17 **Q. Please introduce the other Company witnesses in this proceeding.**

18 **A.** The Company is presenting the following additional witnesses:

- 19 • Thomas G. Hulsebosch, Senior Managing Director for Energy and Utilities with
20 West Monroe Partners, presents the cost-benefit analysis for the Grid
21 Transformation Plan.
- 22 • Nathan J. Frost, Director of New Technology and Energy Conservation, provides
23 details on the Company's plan to deploy AMI across its service territory, the
24 proposed opt-out policy, and the Company's plan for customer education
25 consistent with the 2018 Final Order. Company Witness Frost will also discuss
26 the Smart Charging Infrastructure Pilot Program.

- Thomas J. Arruda, Director of Customer Information Platform, describes the CIP that the Company plans to deploy to transform the customer experience.
- Robert S. Wright, Jr., Director of Distribution Grid Planning and Asset Management, explains the grid improvement investments that the Company proposes for Phase IB of the GT Plan. Company Witness Wright also supports the Company's plans to evolve toward an integrated distribution planning process.
- Bradley R. Carroll, Sr., Director of IT Infrastructure, describes the development and proposed execution of new telecommunications infrastructure enabling the functionality of the other components of the GT Plan for Phase IB. Company Witness Carroll will also differentiate between approved Phase IA and proposed Phase IB telecommunications investments.
- Jonathan S. Bransky, Director of Threat Intelligence, describes the cyber controls that the Company plans to deploy as part of the GT Plan for Phase IB. Company Witness Bransky will also differentiate between approved Phase IA and proposed Phase IB security investments.
- Gregory J. Morgan, General Manager of Regulatory Affairs, addresses the proposed rate treatment of certain GT Plan components and provides a Phase I revenue requirement and estimated rate impact. He also discusses the Company's plan to propose time-varying rates consistent with the process envisioned by recent legislation. Finally, Company Witness Morgan supports the requested tariff approval related to smart meter opt out.

Q. Does this conclude your pre-filed direct testimony?

A. Yes, it does.

**BACKGROUND AND QUALIFICATIONS
OF
EDWARD H. BAINE**

Edward H. Baine is Senior Vice President – Distribution for the Power Delivery Group of Dominion Energy, Inc. (“Dominion Energy”). He is responsible for all facets of Dominion Energy’s regulated electric distribution business that provides electricity to about 2.6 million customer accounts in Virginia and northeastern North Carolina.

Mr. Baine joined Dominion Energy in 1995 as an associate engineer and has held numerous engineering, operational, and management positions within the Company. In 2006, he was named Director – Electric Distribution Operations Centers. He was promoted to Vice President – Shared Services, effective July 1, 2009, and was named Vice President – Fossil & Hydro Merchant Operations in January 2012. He was named Vice President – Power Generation System Operations in July 2013 and Senior Vice President – Transmission & Customer Service in June 2015. He assumed his current post in February 2016.

Mr. Baine is a member of the boards of directors of the Dominion Energy Credit Union, Chamber RVA, Venture Richmond, and the Capital Region Collaborative. He is also a member of the Board of Visitors of Virginia Tech. Mr. Baine also serves on the board of the Chesterfield Public Education Foundation. In addition, Mr. Baine serves on the boards of directors of SEE, the Virginia Tech Athletic Fund, MEGA Mentors, and the Valentine Museum, as well as the EEI National Response and AEIC Power Delivery executive committees.

Mr. Baine earned his bachelor’s degree in electrical engineering from Virginia Tech and completed the advanced management program at Duke University’s Fuqua School of Business. He is a registered professional engineer in Virginia.

Capital Expenditures Summary (GTP)
(Nominal dollars, in millions)

	2019			2020			2021		
	Yr 1	Yr 2	Yr 3	Yr 1	Yr 2	Yr 3	Yr 1	Yr 2	Yr 3
Advanced Metering Infrastructure (AMI)	\$14.9	\$71.9	\$100.3	\$14.9	\$71.9	\$100.3	\$14.9	\$71.9	\$100.3
Customer Information Platform / Meter Data Management (CIP/MDM)	\$7.3	\$38.4	\$45.2	\$7.3	\$38.4	\$45.2	\$7.3	\$38.4	\$45.2
Stakeholder Engagement & Customer Education	-	-	-	-	-	-	-	-	-
Telecommunications	\$6.4	\$65.2	\$66.0	\$6.4	\$65.2	\$66.0	\$6.4	\$65.2	\$66.0
Grid Technologies	\$2.5	\$31.9	\$21.3	\$2.5	\$31.9	\$21.3	\$2.5	\$31.9	\$21.3
Grid Hardening	\$2.2	\$20.9	\$61.3	\$2.2	\$20.9	\$61.3	\$2.2	\$20.9	\$61.3
Cyber Security	-	\$2.9	\$1.9	-	\$2.9	\$1.9	-	\$2.9	\$1.9
Physical Security	\$0.9	\$3.5	\$3.5	\$0.9	\$3.5	\$3.5	\$0.9	\$3.5	\$3.5
Transportation Electrification (GTP Programs Only)	-	\$1.5	\$2.4	-	\$1.5	\$2.4	-	\$1.5	\$2.4
Total Capital Expenditures:	\$34.0	\$236.0	\$301.9	\$34.0	\$236.0	\$301.9	\$34.0	\$236.0	\$301.9
Total Capital Expenditures (Phase 1B):	\$26.8	\$218.4	\$265.4	\$26.8	\$218.4	\$265.4	\$26.8	\$218.4	\$265.4

Projected Capital Expenditures inclusive of GTP programs only

O&M Expenditures Summary (GTP)

(Nominal dollars, in millions)

	2019			2020			2021		
	Yr 1	Yr 2	Yr 3	Yr 1	Yr 2	Yr 3	3-yr Total	10-yr Total	
Advanced Metering Infrastructure (AMI)	\$1.9	\$3.0	\$4.6				\$9.6	\$53.9	
Customer Information Platform / Meter Data Management (CIP/MDM)	\$4.2	\$8.7	\$10.8				\$23.7	\$160.3	
Stakeholder Engagement & Customer Education	\$0.0	\$1.4	\$1.8				\$3.2	\$11.1	
Telecommunications	\$1.2	\$2.3	\$2.9				\$6.3	\$74.4	
Grid Technologies	-	\$1.1	\$1.8				\$2.9	\$45.2	
Grid Hardening	\$6.0	\$6.2	\$8.1				\$20.3	\$36.7	
Cyber Security	-	\$0.9	\$1.4				\$2.3	\$32.1	
Physical Security	\$0.0	\$0.1	\$0.2				\$0.3	\$5.2	
Transportation Electrification (GTP Programs Only)	\$0.4	\$4.9	\$10.9				\$16.2	\$33.5	
Total O&M Expenditures:	\$13.8	\$28.6	\$42.4				\$84.9	\$452.4	
Total O&M Expenditures (Phase 1B):	\$12.6	\$28.4	\$41.9				\$83.0		

Projected Operating Expenditures inclusive of GTP programs only

Proposed Metrics and Witness Support

Benefit Category	Company Identified Benefit	Metric ¹	Witness(es)
Improved Customer Experience	Reduce outage events, including self-healing	SAIDI / SAIFI	Wright
		# of outages and minutes avoided	Wright
	Reduce number of customers affected by outages	# of equipment health issues proactively detected by AMI & automated control systems	Frost / Wright
		# and % of outages detected remotely by AMI and automated control systems	Frost / Wright
	Faster restoration time (shorter outage durations)	Customer minutes of interruption	Wright
		Restoration time for major events	Wright
	Improved support for Distributed Energy Resource (DER) integration	# of events where Company DERMS adjusted/changed DER operational modes to maintain distribution grid reliability	Wright
		# of DER Interconnection requests received, Small Generator Interconnection Agreements (SGIA) completed, and average time to complete SGIA from receipt of electric inspection	Wright
		Total number of DER customers and interconnected MW capacity	Wright
	Reduced likelihood of successful cyber & physical attacks	# of cyber or physical security events associated with GT Plan that require further investigation or analysis.	Bransky
		# of mandatory cyber and physical security incident reports sent to federal agencies	Bransky
	Modernized customer relationship by delivering better information and value to each customer	Outage Center app	Arruda
		What-If Analysis / Rate Comparison by 2023	
		e-Bill upgrade to include graphical usage information by 2023	
		Notification & Alert Options through preferred channel by 2023	
		Account specific details on charges available to customers within online portal by 2023	
		Bill re-design by 2024	
		Average monthly number of bills requiring manual intervention	
	Reduced service order completion times	# of transactions for new capabilities delivered	Frost
		# of remote service orders executed (turn ON/OFF)	
		% of total service orders executed remotely (turn ON/OFF)	
	New rate structures	# of same-day service orders completed	Frost
		# of customers enrolled in opt-in time-varying rate programs	Morgan
	Expanded set of self-service options and digital communication channels	List of digital communication channels introduced	Arruda
	Smart Charging Infrastructure Pilot Program	# of rebates by customer type and \$ deployed	Frost
	Customer Education	# of direct communications	Frost
		# of digital impressions	Frost
		# of public meetings and events	Frost
Reduced Components of Cost of Service	Field labor savings (Incl. reduced truck rolls, # of personnel)	# Ton/Toffs/CNPs	Frost
		# reduced Found Ons	Wright
		Restoration OT Hrs	Wright
	Reduced storm damage restoration costs	Storm related tree trimming expenses	Wright
		# of truck rolls	Wright
	Better management of energy diversion	Annual energy diversion recovery (\$)	Frost
		Annual energy diversion expenses (\$)	Frost
	Improved billing & meter read rate accuracy	# of identified energy diversion customers / incidents	Frost
		# of escalated bill-related customer complaints	Arruda
		# of monthly bills estimated	Frost

¹ Metrics will be reported once available, to the extent enabling infrastructure / technology is deployed and twelve months of data is obtained